

**NORTHROP EXHIBIT H**

Key features:

BSAC

PCR or thermal-cycle driven  
enzyme reactions, but  
includes other DNA (or  
other biochem or chem) reactions  
All techns. involving reaction-based  
methodologies

Ability to integrate elec, mech  
or optical comp's. using micro-fab  
techs:

Reaction parameter control: heating,  
pumping, circulating, cooling

Reaction or reagent detection-manipulation

Fig. 1

BSA Appl. depicted Fig. 2 chamber &  
micro sys. for carrying-out  
PCR reactions. What are  
minimum comp's. of such a system?

Direct:  
mass change,  
density,  
viscosity

- Bio chem reaction manip, control + detection
- ① chamber-wave devices - to pp, mix & detect;
  - ② electrokinetic effects to pp, size or permeability;
  - ③ intergr-T control devices;
  - ④ optical filters;
  - ⑤ chamber w/ heating elements

(2)

ATT

Allen Northrup

Dick White

11/92

→ thermal cycling

claim: mixing chamber; also  
clean system.

micro liter vols → used in system  
smaller - can be done faster  
w/ less power.

96°C → 55°C → heat & cool.  
system on

Re-packaged/chips → novel:  
integ. on chips.

\* PCR or any other reaction that  
requires thermal cycling.  
chem. or bio-chem

Monolithic, microFab device →  
1st time such a sys  
has been done on this scale.

(microscopy) ③

use of hand-held as pp. →  
move particles in single

\* file  
\* chn to see if I have  
file on white's us  
5,006, 149.

unipe: microheaters in chamber  
next part of inv. / system.

Fiber optic inside reaction chamber  
for detection.

PCR techs now take about <sup>1 to 5 minutes</sup> ~~4 or 5 min~~  
~~at inv. can get results in~~  
~~1 to 5 minutes.~~ Fastest  
now in time. ~ can get  
results in a few seconds.  
re cycles on the order of  
a cycle. Due to small  
vols + high surface area  
could be portable + work w/  
batter. as opposed to 110v.

~~to diff. x surface~~

\* Reactions dep. on concentration  
\* at

(4)

on → 3 volts in  $96^{\circ}\text{C}$  based on heater Res.  
off → 1/2 volts in  $55^{\circ}\text{C}$  "

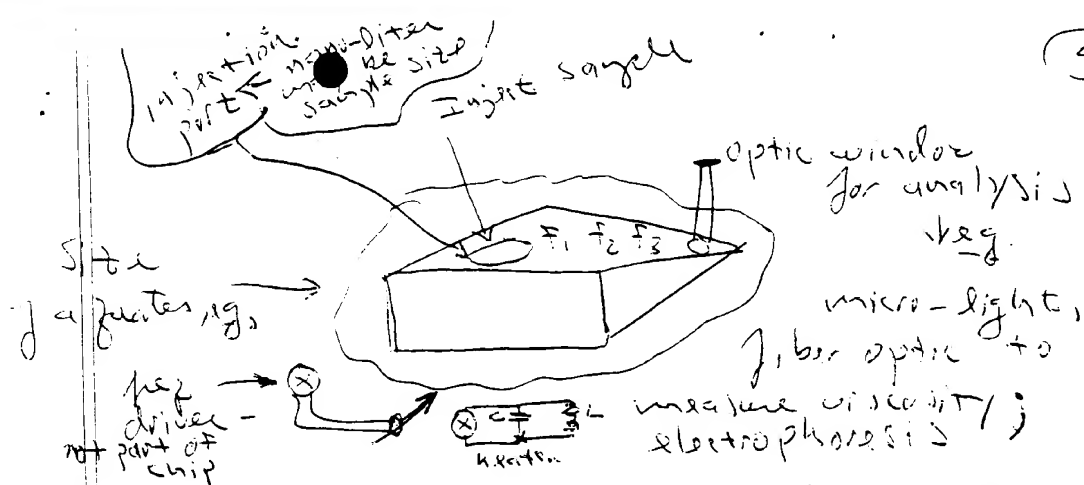
monolithic Forb - is very important  
- can do in batches on  
wafer. Thus they are  
cheap & are disposable.

\* Need spec sheet for chamber  
fabrication

PP/ing in chamber - re Dick  
white

chamber - includes ultrasonic  
agitator for mixing.

↓ Also useful for cell dispensing



pump, mixer etc run  
a diff pres ( $F_1, F_2, F_3$ ) so  
can turn diff comp on & off  
by opening a diff press.  
Heating is also done by turning  $F_4$   
for heater.  
Key doing PC on chip w/  
reaction chamber.

~~Materials~~ Materials used in chamber  
can negatively affect PC  
reaction eg. Calcium  
divalent cations will prevent  
PC from doing.

Reactants on chip in advance  
of said as a unit.

Use of surface tension to maintain reactant

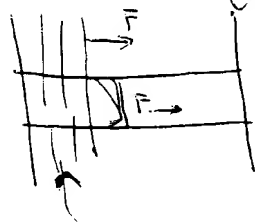
Possible talks / pubs : none on  
the horiz; Oct 1992

Draft appl to Inverters by buying  
to mid-June & file by end  
of June

\* Remote drive

Ados: All parts of channels moved at  
same speed - adv. of in-  
volved pp.

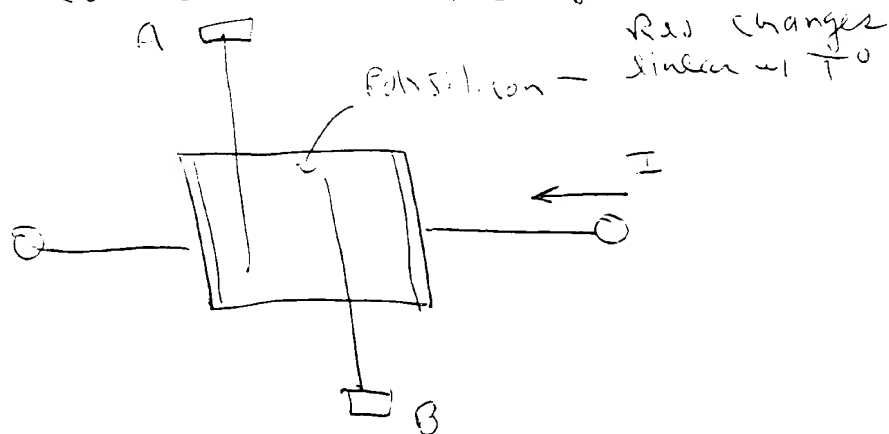
dec white's  
US 5,006,749



Blast Flow  
- more control

Lamb-wave  
generators

$\frac{1}{T^0}$  control  $\rightarrow$  Nice feature.



Use ~~leads~~ <sup>electrodes</sup> A & B to measure  $\frac{1}{T^0}$  change. Send in known current  $I$  & measure voltage bet. electrodes A & B.

This detail should be in log.



SiO<sub>2</sub> - is material at bottom  
of chamber; std material  
handled by bio-chemists

DNA probes - in chamber;  
parts attach to probes + detector  
change so know have attachment  
to probes.